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Fish and Game Commission

Sonke Mastrup, Executive Director
1416 Ninth Street, Room 1320
Sacramento, CA 95814
(916) 653-4899
(916) 653-5040 Fax
www.fgc.ca.gov

8/26/14

August 19, 2014

TO ALL AFFECTED AND INTERESTED PARTIES:

This is to provide you with a Notice of Findings regarding the Northeastern Pacific white shark which will be published in the California Regulatory Notice Register on August 22, 2014.

Sincerely,

Sheri Tiemann

Sheri Tiemann
Associate Governmental Program Analyst

Attachment

PROPOSED FINDINGS
White Shark
(*Carcharodon carcharias*)

NOTICE IS HEREBY GIVEN that the Fish and Game Commission (Commission), at its June 4, 2014 meeting in Fortuna, California, made a finding pursuant to Fish and Game Code section 2075.5, that the petitioned action to add the Northeastern Pacific (NEP) white shark (*Carcharodon carcharias*) to the list of threatened or endangered species under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.) is not warranted. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1).)

NOTICE IS ALSO GIVEN that, at its August 6, 2014 meeting in San Diego, California, the Commission adopted the following findings outlining the reasons for its rejection of the petition.

I. BACKGROUND AND PROCEDURAL HISTORY

Petition History

Oceana, the Center for Biological Diversity, and Shark Stewards (collectively, Petitioners) submitted a petition (Petition) to the Commission on August 20, 2012 to list the NEP population of white shark (*Carcharodon carcharias*) as a threatened or endangered species pursuant to CESA. (Cal. Reg. Notice Register 2012, No. 37-Z, p. 1376) The Commission received the Petition on August 20, 2012. The Commission referred it for evaluation to the California Department of Fish and Wildlife (Department) on August 27, 2012 pursuant to Fish and Game Code section 2073.

The Department evaluated the Petition, using the information in that document and other relevant information available at that time, and found that the scientific information presented in the Petition was sufficient to indicate that the petitioned action may be warranted. On January 7, 2013, the Department submitted to the Commission its Evaluation of the Petition from Oceana, Center for Biological Diversity (CBD), and Shark Stewards to List Northeast Pacific White Shark (*Carcharodon carcharias*) as Threatened or Endangered (Petition Evaluation). The Department recommended that the Commission accept the Petition pursuant to Fish and Game Code section 2073.5.

On February 6, 2013, at its meeting in Sacramento, California, the Commission received public comment and determined that there was sufficient information in the Petition to indicate that the petitioned action may be warranted, accepted for

consideration the Petition, and designated the white shark as a candidate species under CESA. (Cal. Reg. Notice Register 2013, No. 9-Z, p. 373.)

The Department promptly notified affected parties by issuing a press release, posting notice on the Department's website, and sending targeted letters to stakeholder groups including affected commercial fishing interests and scientific researchers holding scientific collecting permits for white shark. (Fish & G. Code, § 2074.4.)

Consistent with Fish and Game Code section 2074.6 and its implementing regulations, the Department commenced a twelve-month status review of the white shark following published notice of its designation as a candidate species under CESA. As an integral part of that effort, the Department solicited data, comments, and other information from interested members of the public and the scientific and academic communities. The Department and the Commission received 35,502 pieces of correspondence during the public notice period ending February 1, 2014. The majority of comments were from members of the public without stated affiliation. In January 2013, two shark experts opposed to the listing submitted peer reviewed publications and expert scientific comment. In May of 2013 the Petitioners submitted four peer reviewed scientific publications. On December 18, 2013, Oceana and CBD submitted supplemental information, in the form of a non-peer reviewed critical assessment of the analysis of the NEP white shark population size and risk of extinction prepared by the Biological Review Team (BRT) of the National Marine Fisheries Service (NMFS).

On January 6, 2014, the Department submitted a preliminary draft of its status review for independent scientific peer review by a number of individuals acknowledged to be experts on white shark, possessing the knowledge and expertise to critique the scientific validity of the report. (Fish & G. Code, § 2074.8; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2).) On April 3, 2014, the Department submitted its final Status Review of White Shark (*Carcharodon carcharias*) in California to the Commission (Status Review). Based on its Status Review and the best available science, the Department recommended to the Commission that designating white shark as a threatened or endangered species under CESA is not warranted (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f).). Following receipt, the Commission made the Department's Status Review available to the public, inviting further review and input. (Cal. Code Regs., tit. 14, § 670.1, subd. (g).)

On June 4, 2014, at its meeting in Fortuna, California, the Commission received public comment, accepted additional information from Petitioners and the public, and considered final action regarding the Petition to designate white shark as a threatened or endangered species under CESA. (Fish & G. Code, § 2075.5; Cal. Code Regs., tit. 14, § 670.1, subd. (i).) After receiving public comment, the Commission closed the administrative record of proceedings for the Petition. (Fish & G. Code, § 2075.5, subd.

(a).) The Commission considered the petition, further information submitted by Petitioners, public comment, the Department's 2012 Petition Evaluation, the Department's 2014 Status Review, and other information included in the Commission's administrative record of proceedings. Following public comment and deliberation, the Commission determined, based on the best available science, that designating white shark as a threatened or endangered species under CESA is not warranted. (Fish & G. Code, § 2075.5, subd. (e)(1); Cal. Code Regs., tit. 14, § 670.1, subd. (i)(2).) The Commission directed its staff, in coordination with the Department, to prepare findings of fact consistent with the Commission's determination and to present those findings for consideration and ratification at the Commission's August, 6, 2014 meeting in San Diego, California.

Species Description

The white shark is a large migratory apex predator that is globally distributed throughout the world's oceans, most commonly found in temperate waters between 54 and 68°F. While it is believed to be a mostly solitary animal, individuals congregate in specific areas off most continents. White sharks range in size from 3.9 to 5.9 feet total length (measured from the nose to the tip of the upper lobe of the tail [TL]) at birth to greater than 20 feet TL for females and 18 feet TL for males (e.g., Cailliet et al. 1985; Ebert 2003; Castro 2012). New aging techniques estimate that white sharks live longer than previously thought, possibly to 70 or more years.

White sharks are oophagous (developing embryos feed on eggs within the mother's uterus) and litters of 2 to 14 pups have been documented. Females are believed to give birth in or near the Southern California Bight (SCB) and northern Mexico in late spring and summer. Similar to other large apex predators, white sharks mature relatively late, have naturally low abundance, low fecundity, and relatively long life spans. Relatively few offspring are likely to reach maturity, as apex predator populations usually support fewer individuals than species lower on the food chain. This makes white shark populations potentially vulnerable to overexploitation.

Juvenile white sharks feed on fish and invertebrates (e.g., Klimley 1985). As they grow in size and become sub-adults they begin to forage on marine mammals. Little is known about the period of transition from juvenile to adult including the age at which these transitions occur, where they go during this time, and when they begin to make inshore/offshore migrations or utilize adult aggregation sites (e.g., Domeier 2012a). Some researchers (e.g., Klimley 1985; Domeier 2012) speculate that at approximately three years of age sub-adults begin to range farther from the nursery grounds into colder waters. In this stage they may range widely from Oregon (or farther north) to southern Mexico and the Gulf of California. These theories are supported by the limited information available on this life stage; however, validation through mark-recapture and

other studies is needed to have more conclusive information on movement patterns for sub-adults.

The NEP population of white sharks found in California waters is a demographically-isolated population that shows significant genetic divergence from other global populations in Australia and South Africa (e.g., Jorgensen et al. 2010; Gubili et al. 2012). The known range of the NEP population of white shark extends from Mazatlán, Mexico and the Gulf of California north to the Bering Sea; and from the west coast of North America to the Hawaiian Islands. White sharks inhabit both inshore and offshore areas, from the continental shelf to the Shared Offshore Focal Area (SOFA) between California and Hawaii. The SOFA is a vast area of deep open water habitat that is shared by white sharks from both central California and Guadalupe Island during the offshore phase of their migration.

Federal Status

In June 2012, WildEarth Guardians submitted a petition to NMFS requesting that the NEP population of white shark be listed as endangered or threatened under the federal Endangered Species Act (ESA). In August 2012, Petitioners submitted a similar petition to NMFS. In September 2012, NMFS published a 90-day finding (77 Fed. Reg. 59582 (2012)) announcing that both petitions presented substantial scientific information indicating that the NEP population of white shark may warrant listing under ESA and that NMFS would conduct an ESA status review. To aid in this review, NMFS formed a Biological Review Team (BRT), consisting of scientists from the Southwest Fisheries Science Center. The BRT prepared its Status Review of the Northeastern Pacific Population of White Sharks (*Carcharodon carcharias*) under the Endangered Species Act. On June 28, 2013, based on the BRT's peer-reviewed analysis, NMFS issued its 12-Month Finding on Petitions to List the Northeastern Pacific Ocean Distinct Population Segment of White Shark as Threatened or Endangered Under the Endangered Species Act, in which NMFS found that the NEP population of white shark was a distinct population segment but was not in danger of extinction under ESA criteria nor was it likely to become so within the foreseeable future. (78 Fed. Reg. 40104 (2013).)

Although not a listed or candidate species under ESA, white shark is protected under several federal laws, regulations, and management efforts.

- Federal law prohibits trade in all white shark products, as the U.S. recognizes the Convention on International Trade and Endangered Species (CITES) treaty. This is supported by the Lacey Act, which makes it unlawful to import, export, sell, acquire or purchase any fish, animal or plant protected by state or international law, including CITES.

- Take of white shark is prohibited under the West Coast Highly Migratory Species Fishery Management Plan (HMS FMP). The scope of this prohibition covers all United States vessels that fish for HMS species using authorized gear within the United States Exclusive Economic Zone (EEZ; 370 kilometer, 200 nautical miles) as well as the west coast state territorial waters of California, Oregon, and Washington. Additionally this applies to those vessels fishing the high seas and landing in the States of California, Oregon, and Washington. The large mesh drift gill net fishery targeting swordfish and thresher shark is a federally managed fishery under the HMS FMP. Originally managed by the State of California, this fishery came under federal jurisdiction with the adoption of the HMS FMP, and California's protective measures for white shark were incorporated into the federal regulations.

- The Gulf of the Farallones National Marine Sanctuary (GFNMS) and the Monterey Bay National Marine Sanctuary (MBNMS), have prohibitions on attracting white sharks. Additionally, the GFNMS also prohibits vessels from approaching within 50 meter (164 feet) of white sharks within 3.7 kilometer (2 nautical miles) of the islands. These prohibitions were put in place to manage adventure tourism, filming, and research activities associated with white sharks that have potential to cause disturbance to natural behavior. The GFNMS issues permits to allow some activities related to education and research that allow exceptions to prohibitions on a case-by-case basis.

- The Shark Finning Prohibition Act of 2000 amended the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and prohibits shark finning within the jurisdiction of the United States. This Act also prohibits the custody, control, or possession of shark fins aboard a fishing vessel without the carcass or landing of shark fins without the carcass.

- The Shark Fin Conservation Act of 2010 strengthens the prohibitions on shark finning under the MSA and under the High Seas Driftnet Fishing Moratorium Protection Act (HSDFMPA). The prohibitions on shark finning under MSA and the HSDFMPA provide some additional protections for white shark.

II. STATUTORY AND LEGAL FRAMEWORK

These proposed findings are prepared as part of the Commission's final action under CESA regarding the Petition to designate white shark as a threatened or endangered species under CESA. As set forth above, the Commission's determination that listing white shark is not warranted marks the end of formal administrative proceedings under CESA. (See generally Fish & G. Code, § 2070 et seq.; Cal. Code Regs., tit. 14, § 670.1.) The Commission, as established by the California Constitution, has exclusive statutory authority under California law to designate endangered, threatened, and

candidate species under CESA. (Cal. Const., art. IV, § 20, subd. (b); Fish & G. Code, § 2070.)

The CESA listing process for white shark began in the present case with Petitioners' submittal of their Petition to the Commission in August 2012 (Cal. Reg. Notice Register 2012, No. 37-Z, p. 1376.). The regulatory process that ensued is described above in some detail, along with related references to the Fish and Game Code and controlling regulation. The CESA listing process generally is also described in some detail in published appellate case law in California, including:

- *Mountain Lion Foundation v. California Fish and Game Commission* (1997) 16 Cal.4th 105, 114-116;
- *California Forestry Association v. California Fish and Game Commission* (2007) 156 Cal.App.4th 1535, 1541-1542;
- *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, 600; and
- *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104, 1111-1116.

The "is not warranted" determination at issue here for white shark stems from Commission obligations established by Fish and Game Code section 2075.5(e). Under this provision, the Commission is required to make one of two findings for a candidate species at the end of the CESA listing process: whether the petitioned action is warranted or is not warranted. Here with respect to white shark, the Commission made the finding under Section 2075.5(e) that the petitioned action is not warranted.

The Commission was guided in making this determination by various statutory provisions and other controlling law. The Fish and Game Code, for example, defines an endangered species under CESA as a native species or subspecies of a bird, mammal, fish, amphibian, reptile or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, over exploitation, predation, competition, or disease (Fish & G. Code, § 2062.). Similarly, the Fish and Game Code defines a threatened species under CESA as a native species or subspecies of a bird, mammal, fish, amphibian, reptile or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. *(Id.*, § 2067.)

As established by published appellate case law in California, the term "range" for purposes of CESA means the range of the species within California (*California Forestry Association v. California Fish and Game Commission*, *supra*, 156 Cal. App.4th at p. 1540, 1549-1551.).

The Commission was also guided in making its determination regarding white shark by Title 14, section 670.1, subdivision (i)(1)(A), of the California Code of Regulations. This provision provides, in pertinent part, that a species shall be listed as endangered or threatened under CESA if the Commission determines that the continued existence of the species is in serious danger or is threatened by any one or any combination of the following factors:

1. Present or threatened modification or destruction of its habitat;
2. Overexploitation;
3. Predation;
4. Competition;
5. Disease; or
6. Other natural occurrences or human-related activities.

Fish and Game Code section 2070 provides similar guidance. This section provides that the Commission shall add or remove species from the list of endangered and threatened species under CESA only upon receipt of sufficient scientific information that the action is warranted. Similarly, CESA provides that all state agencies, boards, and commissions shall seek to conserve endangered and threatened species and shall utilize their authority in furtherance of the purposes of CESA (Fish & G. Code, § 2055.). This policy direction does not compel a particular determination by the Commission in the CESA listing context. Yet, the Commission made its determination regarding white shark mindful of this policy direction, acknowledging that "'[l]aws providing for the conservation of natural resources' such as the CESA 'are of great remedial and public importance and thus should be construed liberally" (*California Forestry Association v. California Fish and Game Commission*, *supra*, 156 Cal. App.4th at pp. 1545-1546, citing *San Bernardino Valley Audubon Society v. City of Moreno Valley* (1996) 44 Cal.App.4th 593, 601; Fish & G. Code, §§ 2051, 2052.).

Finally in considering these factors, CESA and controlling regulations require the Commission to actively seek and consider related input from the public and any interested party (See, e.g., *Id.*, §§ 2071, 2074.4, 2078; Cal. Code Regs., tit. 14, § 670.1, subd. (h).). The related notice obligations and public hearing opportunities before the Commission are also considerable (Fish & G. Code, §§ 2073.3, 2074, 2074.2, 2075, 2075.5, 2078; Cal. Code Regs., tit. 14, § 670.1, subds. (c), (e), (g), (i); see also Gov. Code, § 11120 et seq.). All of these obligations are in addition to the requirements prescribed for the Department in the CESA listing process, including an initial evaluation of the petition and a related recommendation regarding candidacy, and a 12-month status review of the candidate species culminating with a report and recommendation to the Commission as to whether listing is warranted based on the best available science (Fish & G. Code, §§ 2073.4, 2073.5, 2074.4, 2074.6; Cal. Code Regs., tit. 14, § 670.1, subds. (d), (f), (h).).

III. FACTUAL AND SCIENTIFIC BASIS FOR THE COMMISSION'S FINDINGS

The factual and scientific bases for the Commission's finding that designating white shark as a threatened or endangered species under CESA is not warranted are set forth in detail in the Commission's administrative record of proceedings. The evidence in the administrative record in support of the Commission's determination includes, but is not limited to, the Department's 2013 Petition Evaluation and 2014 Status Review, and other information specifically presented to the Commission and otherwise included in the Commission's administrative record as it exists up to and including the Commission meeting in Fortuna, California on June 4, 2014. The administrative record also includes these findings.

The Commission finds the substantial evidence highlighted in the preceding paragraph, along with other evidence in the administrative record, supports the Commission's determination that the continued existence of white shark in the State of California is not in serious danger of becoming extinct or threatened by on or a combination of the following factors:

1. Present or threatened modification or destruction of its habitat;
2. Overexploitation;
3. Predation;
4. Competition;
5. Disease; or
6. Other natural occurrences or human-related activities.

The Commission also finds that the same evidence constitutes sufficient scientific information to establish that designating white shark as a threatened or endangered species under CESA is not warranted. The Commission finds in this respect that white shark is not in serious danger of becoming extinct throughout all, or a significant portion, of its range in California. Similarly, the Commission finds that white shark is not presently threatened and it is unlikely to become an endangered species in the foreseeable future in the absence of special protection and management efforts required by CESA.

The following Commission findings highlight in more detail some of the scientific and factual information and other evidence in the administrative record of proceedings that support the Commission's determination that designating white shark as a threatened or endangered species under CESA is not warranted:

1. The first attempt to estimate the NEP white shark population consisted of two independent Photo-ID studies in Central CA and Mexico. The Petitioners combined these results into a non-peer reviewed estimate of 339 adults and sub-

adults in the NEP. Although a population of apex predators is expected to be relatively small, the Department concluded that this estimate likely underestimates the population. The Department found the limited geographic range of these studies and the short time span of the central California study problematic in particular, in addition to other factors. This conclusion is supported by several scientific publications, including a peer reviewed assessment of the population conducted by National Marine Fisheries Service scientists that estimates 3,000 total individuals of all life stages (e.g., Domeier 2012b; Dewar et al. 2013). This estimate utilized augmented datasets from both photo-ID studies and accounted for biases found in the original studies.

2. Historically, the largest threat to white sharks—primarily young-of-the-year (YOY) and juveniles—in the NEP has been incidental take in set gill net fisheries. Commercial fishing records indicate a peak in white shark interactions in the mid-1980s. Since this peak, protections for white shark have progressively increased, and commercial gill net effort off California has dropped to a fraction of its historic size and the geographic area open to fishing has been dramatically reduced by state and federal regulations (Cal. Fish & G. Code, §§ 5517, 8575, 8575.5, 8599, 8610.3, 8664.8; Cal. Code Regs., tit. 14, §§ 28.06, 104.1).

3. Interactions with commercial set gill net gear in California have started to increase over the past ten years even as fishing effort has continued to decline. Current research suggests this trend could signal an increase in the population of young white sharks in the SCB (e.g., Lowe et al. 2012; Lyons et al. 2013).

4. Prior to 2010 there were essentially no observed white shark attacks on California sea lions by marine mammal researchers in the northern Channel Islands. In 2011, approximately 136 bite marks were recorded and over 300 were recorded in 2012 (e.g., Dewar et al. 2013). Similarly, over the past five years, researchers have documented a dramatic increase in the number of California southern sea otter mortalities linked to white shark bites in Monterey Bay, north of Santa Cruz, and in San Luis Obispo County (e.g., M. Harris, CDFW-OSPR pers. comm.). While it is not definitive that these increases are due to an increase in the NEP white shark population, there have not been notable decreases in attacks in other locations (e.g., Dewar et al. 2013). Therefore, it is reasonable to infer there may be more sharks foraging on marine mammals and sharks moving to different forage areas.

5. Recent research in the SCB has found that young white sharks can carry a significantly high level of persistent toxins such as PCBs, DDT, and mercury in their tissues (e.g., Mull et al. 2012; Mull et al. 2013). Despite these high levels of contaminants, young white sharks do not seem to show any deleterious effects and there is no evidence that these toxic loads affect their ability to survive.

6. Recent models of climate change suggest a potential increase in the availability of suitable habitat for adult white shark (e.g., Hazen et al. 2012). An increase in water temperature could expand the white sharks range into areas that are

currently too cold for the species to utilize, but this remains speculative and limited across the population's life stages.

7. In addition to large size, even at birth, utilization of shallow nearshore habitat during the first three years of life likely provides some level of protection for YOY and juveniles from large predators (e.g., Pyle et al. 1999), and it is unlikely that predation is a significant threat to the population.
8. White sharks are larger, in all life stages, than most of the predators in which they share habitat, reducing the risk from competition with other species. In addition, their ability to feed on a range of prey make it unlikely the population would be susceptible to catastrophic decline from the absence of a specific prey species (e.g., Klimley 1985; Carlisle et al. 2012; Domeier 2012a; Dewar et al. 2013; Kim et al. 2012).

IV. ADDITIONAL CONSIDERATIONS INFORMING THE COMMISSION'S FINAL DETERMINATION

The Commission's determination that designating white shark as a threatened or endangered species under CESA is not warranted; it is informed by various additional considerations. In general, the Fish and Game Code contemplates a roughly twelve-month long CESA listing process before the Commission, including multiple opportunities for public and Department review and input and peer review (See generally Fish & G. Code, § 2070 et seq.; Cal. Code Regs., tit. 14, § 670.1.). From the initial receipt of the Petition in August 2012 through the Commission's decision on June 4, 2014 that listing is not warranted, the Department and the Commission received numerous comments and other significant public input regarding the status of white shark from a biological and scientific standpoint and with respect to the petitioned action under CESA. The Commission, as highlighted below, was informed by and considered all of these issues, among others, in making its final determination that designating white shark as a threatened or endangered species under CESA is not warranted (Fish & G. Code, § 2075.5, subd. (e)(1); Cal. Code Regs., tit. 14, § 670.1, subd. (i)(2).).

V. SCIENTIFIC DETERMINATIONS REGARDING THE STATUS OF THE NORTHEASTERN POPULATION OF WHITE SHARK

CESA defines an endangered species as one "which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, over exploitation, predation, competition, or disease" (Fish & G. Code, § 2062.). CESA defines a threatened species as one "that, although not presently threatened with extinction, is likely to become an endangered

species in the foreseeable future in the absence of special protection and management efforts required by [CESA]" (Id., § 2067).

Pursuant to CESA's implementing regulations, a "species shall be listed as endangered or threatened ... if the Commission determines that its continued existence is in serious danger or is threatened by anyone or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities" (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A).).

Present or threatened Modification or Destruction of Habitat

- White sharks, like other apex predators, can accumulate contaminants over their lifespan. However, high tissue levels of elemental and organic contaminants have not been found to cause deleterious effects in NEP white sharks. Environmental monitoring data have shown that contaminant inputs have greatly been reduced off California through federal, state, and local regulatory efforts, reducing risks from habitat degradation (e.g., Mull et al. 2012; Mull et al. 2013).

- Similar to other large marine species, white sharks may be susceptible to ingestion and entanglement by marine debris, but risks to the population appear to be low. There have been no documented entanglements involving white sharks in the NEP (e.g., Taylor 2010). Additionally, lamnid sharks have the capability of evacuating their stomachs, which may reduce ingestion risks (e.g., Kerstetter et al. 2004; Brunnschweiler et al. 2011).

- Recent models of climate change suggest a potential increase in the availability of suitable habitat for adult white shark, but this remains speculative and limited across the population's life stages (e.g., Hazen et al. 2012). White sharks are highly migratory and range across large expanses of the NEP, and there is evidence indicating that white sharks are able to deal with wide variations in temperature and dissolved oxygen concentration (e.g., Boustany et al. 2002; Nasby-Lucas et al. 2009; Siebel 2011; Nasby-Lucas et al. 2012). At this time there is not sufficient scientific information to assess the specific potential or actual impacts of ocean warming, acidification or de-oxygenation on the population of white sharks inhabiting the NEP.

- Based on the best scientific information available, the Commission finds that the continued existence of the NEP population of white shark is not in serious danger or threatened by present or threatened modification or destruction of habitat.

Overexploitation

- White sharks in the NEP are widely protected on the west coast through state, federal, and international efforts directly through take prohibitions for this species, as well as through regulation of fisheries and sharks generally that provide

protections indirectly (Cal. Fish & G. Code, §§ 5517, 8575, 8575.5, 8599, 8610.3, 8664.8; Cal. Code Regs., tit. 14, §§ 28.06, 104.1).

- White sharks have been a protected species under California law since 1994 (Cal. Fish & G. Code, §§ 5517, 8599).
- Interactions are also known to occur in Mexican commercial gill net fisheries. However, prohibitions on take of white shark have become progressively stringent, reducing risk, although limited resources for monitoring and enforcement exist (e.g., DOF 2002, 2007, 2014; Barreira 2007).
- Nearshore set gill net fisheries account for over 80 percent of documented interactions with white shark off California (e.g., Lowe et al. 2012). Catch records of incidental white shark take by gill net gear off California declined steadily from 1990 until 2005, indicating gill net area closures implemented during the 1990s were effective in reducing incidental take of juvenile white shark in the nearshore waters of the SCB (e.g., Lowe et al. 2012; CDFW 2014).
- The recent increase in interactions with gill net gear is likely due to an increase in the population of YOY and juvenile white sharks in the SCB (e.g., Lowe et al. 2012; Lyons et al. 2013).
- Based on the best scientific information available, the Commission finds that the continued existence of the NEP population of white shark is not in serious danger or threatened by overexploitation.

Predation

- White sharks are apex predators and generally considered to be at the top of the food chain during most life history stages. However, available interaction data show some white shark predation by orcas and larger sharks (e.g., Pyle et al. 1999). In addition to large size, even at birth, utilization of shallow nearshore habitat during the first three years of life likely provides some level of protection for YOY and juveniles from large predators.
- Based on the best scientific information available, the Commission finds that the continued existence of the NEP population of white shark is not in serious danger or threatened by predation.

Competition

- Competition for prey (mainly fish for juveniles and pinnipeds for adults) between white sharks and other species in their habitat is not well understood. There may be competition from other large predator species (e.g., Dewar et al. 2013), but there is no indication this poses a significant population risk. White sharks are generalist feeders and are considered resilient to changes in prey abundance and distribution. Populations of their prey species are healthy and likely to support predator populations.

- Based on the best scientific information available, the Commission finds that the continued existence of the NEP population of white shark is not in serious danger or threatened by competition.

Disease

- All species of sharks may develop disease; and tumors have recently been documented in single white shark in Australia (e.g., Robbins et al. 2013). However, like other shark species, white sharks have a generalized immune system and other adaptations that make disease rare (e.g., Compagno 2001; Ebert 2003).

- Based on the best scientific information available, the Commission finds that the continued existence of the NEP population of white shark is not in serious danger or threatened by disease.

Other Natural Occurrences or Human-Related Activities

- Strikes by commercial shipping vessels are a potential risk for white sharks. The frequency and severity of ship strikes are not well known, even for marine mammals, due to failures to report collisions, delayed death post impact, inability to locate carcasses after an impact, and the difficulty of determining the actual cause of death. There is little documentation on the frequency and effects of ship strikes on white sharks. However, the risk of ship strikes to white sharks in the NEP may be reduced by the recent relocation of shipping lanes adjacent to the Gulf of the Farallones, Channel Islands, and Cordell Banks National Marine Sanctuaries adopted by the International Maritime Organization (e.g., Drake 2013; NOAA 2012). While the full risk of ship strikes are still unknown they do not appear to pose a significant risk to the population at this time.

- Based on the best scientific information available, the Commission finds that the continued existence of the NEP population of white shark is not in serious danger or threatened by other natural occurrences or human-related activities.

Summary of Key Findings

Based on the criteria described above, the best scientific information available to the Commission indicates that white shark is not currently in serious danger of becoming extinct in California within the next few decades, nor in the foreseeable future in the absence of special protection and management under CESA.

The current size of the NEP population is uncertain. While there are no historic estimates for comparison, independent trends in incidental catch in fisheries and increases in attacks on marine mammals suggest a stable or increasing population which is supported by genetic analysis indicating a robust population.

Incidental take of juvenile white sharks in set gill net fisheries is a potential risk factor for this population. However, this risk has been reduced considerably as these fisheries have become more restricted through regulation and declining effort. Based on trends in commercial fisheries and existing regulations, the Department does not consider future impacts of commercial gill net fishing to a be an immediate threat to the continued existence of the NEP population of white sharks in California.

The Department evaluated other factors, such as contaminants and non-point source pollution, predation, disease, competition, climate change, and availability of prey. Based on the Department's analysis, none of these factors is considered to be a serious threat to the continued existence of the NEP white shark population.

Based on the best scientific information available, the Department concludes the continued existence of the NEP population of white shark is not in serious danger or threatened. Minimizing impacts to individuals could be achieved by managing interactions with commercial and recreational fisheries. Currently California gill net fisheries are heavily regulated and do not appear to be increasing in effort now, nor does it appear likely they will in the near future. Interactions should continue to be monitored but are likely not a threat to the increasing population. Further, the Department generated the following recommendations to prioritize conservation, research, regulation and monitoring activities.

- Increase coordination with other fisheries agencies to establish continuity in management goals, enforcement, and conformance in regulations. Encourage studies designed to reduce lethal interactions with fishing operations, especially with nearshore gill net fisheries that are more likely to have interactions with YOY and juvenile white sharks. Research should include exploration of gear and method modifications (soak time, etc.) that reduce lethal interactions.
- Increase observer coverage on commercial fishing vessels, especially those participating in the nearshore gill net fisheries.
- Implement regulation of recreational tourism (cage diving, viewing, etc.).
- Implement a public outreach and education program, especially in the shore based sector of the recreational fishery. The program should inform constituents about the presence of YOY and juvenile white sharks in the SCB, and how they can help protect this species through appropriate fishing practices and by avoiding interaction with the species.
- Increase monitoring and enforcement of recreational tourism in areas where interactions with white sharks are high.
- Support research specifically focused on juvenile and sub-adult white shark movements through the SCB, Mexico, and other areas within the species' range.

- Encourage the expansion of efforts to determine current population and abundance trends. Efforts should include:
  - The continuation of photo-ID studies in Guadalupe Island and central California, including a comparison of the two databases, consideration of alternate methods of identification (e.g., Computer identification via DARWIN; Towner et al. 2013), and expansion of spatial and temporal scope to additional pinniped rookeries and seasons.
  - The expansion of genetic research to include comparison of samples from both aggregation sites and throughout range, and identification of parentage.
  - Support continued life history research of all life stages of white shark. Including migration, habitat use and range, feeding ecology, and reproduction.
  - Expand the range and scope of tagging studies to include:
    - ◊ Areas outside of the two main aggregation sites,
    - ◊ Increased focus on mature females,
    - ◊ Increased acoustic tagging of YOY and juvenile white sharks in SCB and Mexican nursery areas,
    - ◊ Increased deployment of acoustic sensors from Mexico to Washington.
- Continue current efforts to determine the effects of persistent environmental pollutants, and environmental changes related to climate change, such as ocean acidification, on large shark species and their preferred prey species.
- Encourage research and awareness of less common factors, such as predation and disease, across all life stages.
- Encourage the Pacific Fishery Management Council to recommend that U.S. delegates to international regulatory bodies and regional fisheries management organizations support measures to make white sharks a prohibited species. Specifically, the U.S. delegates to entities including the Inter-American Tropical Tuna Commission and the Western Central Pacific Fisheries Commission.

VI. FINAL DETERMINATION BY THE COMMISSION

The Commission has weighed and evaluated all information and inferences for and against designating white shark as a threatened or endangered species under CESA. This information includes scientific and other general evidence in the Petition, the Department's 2012 Petition Evaluation, the Department's 2014 peer-reviewed Status Review, and the Department's related recommendations based on the best available science, written and oral comments received from the public and the scientific community, and other evidence included in the Commission's administrative record of

proceedings. Based on the evidence in the administrative record, the Commission has determined that the best scientific information available indicates that the continued existence of white shark in California is not in serious danger or threatened in the foreseeable future by present or threatened modifications or destruction of white shark habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities (See generally Fish & G. Code, §§ 2062, 2067; Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A).). The Commission finds, for the same reason, that there is not sufficient scientific information at this time to indicate that the petitioned action is warranted (Fish & G. Code, §§ 2070, 2075.5.). The Commission finds that designating white shark as a threatened or endangered species under CESA is not warranted and that, with adoption of these findings, for purposes of its legal status under CESA shall revert to its status prior to the filing of the Petition (Fish & G. Code, § 2075.5, subd. (e)(1); Cal. Code Regs., tit. 14, § 670.1, subd., (i)(2).)

Sonke Mastrup
Executive Director
Fish and Game Commission
Dated: August 6, 2014

References

Barreira A. 2007. The protection of sharks: A legal and policy analysis. Prepared for Oceana by Instituto Internacional de Derecho y Medio Ambiente. 1–69.[Ŧ]

Boustany AM, Davis SF, Pyle P, Anderson SD, Le Boeuf BJ, Block BA. 2002. Expanded niche for white sharks. Nature. 415:35–36.

Brunnschweiler JM, Nielsen F, Motta P. 2011. In situ observation of stomach eversion in a line-caught Shortfin Mako (Isurus oxyrinchus). Fisheries Research. 109:212–216.

Cailliet GM, Natanson LJ, Welden B, Ebert D. 1985. Preliminary Studies on the Age and Growth of the White Shark, Carcharodon carcharias, Using Vertebral Bands Sibley G, Seigel JA, Swift CC, editors. Biology of the White Shark, a Symposium. 9:49–60.

Carlisle AB, Kim SL, Semmens BX, Madigan DH, Jorgensen SJ, Perle CR, Anderson SD, Chapple TK, Kanive PE, Block BA. 2012. Using Stable Isotope Analysis to Understand the Migration and Trophic Ecology of Northeastern Pacific White Sharks (Carcharodon carcharias). PLoS ONE. 7(2):1–15.

Castro JI. 2012. A Summary of Observations on the Maximum Size Attained by the White Shark, Carcharodon carcharias. In: Domeier ML, editor. Global Perspectives on the the Biology and Life History of the White Shark. Boca Raton, FL: CRC Press. pp. 85–90.

Compagno LJV. 2001. Family Lamnidae. In: Compagno LJV, editor. Sharks of the world: An annotated and illustrated catalogue of shark species known to date. Volume 2. Bullhead, mackerel, and carpet sharks (Heterodontformes, Lamniformes, and Orectolobiformes). Vol. 2. FAO Species Catalouge for Fishery Purposes; pp. 96–107.

Dewar, H., T. Eguchi, J. Hyde, D. Kinzey, S. Kohin, J. Moore, B. L. Taylor, and R. Vetter. 2013. Status review of the northeastern Pacific population of white sharks (Carcharodon carcharias) under the Endangered Species Act. Prepared by the NMFS Southwest Fisheries Science Center. La Jolla, CA.

DOF. 2002. Normal Oficial Mexicana NOM-059-ECOL-2001, Protección ambiental–Especies nativas de México de flora y fauna silvestres–Categorías de riesgo y especificaciones para su inclusión, exclusión ocambio–Lista de especies en riesgo. SEMARNAT, Diario Oficial de la Federación, 6 de marzo de 2002, segunda sección.

DOF. 2007. Normal Oficial Mexicana NOM-029-PESC-2006, Pesca responsable de tiburones y rayas: Especificaciones para su aprovechamiento. SAGARPA. Diario Oficial de la Federación, 14 de febrero de 2007, primera sección.

DOF. 2014. ACUERDO por el que se establece veda permanente para la pesca de tiburón blanco (Carcharodon carcharias) en aguas de jurisdicción federal de los Estados Unidos Mexicanos. SAGARPA. Diario Oficial de la Federación, 27 de enero 2014, primera sección.

Domeier ML. 2012a. A New Life-History Hypothesis for White Sharks, Carcharodon carcharias, in the Northeastern Pacific. In: Domeier ML, editor. Global Perspectives on the the Biology and Life History of the White Shark. Boca Raton, FL: CRC Press; pp. 199–224.

Domeier ML. 2012b. How Many White Sharks are Swimming in the Northeast Pacific? Marine CSI [Internet]. Available from: http://www.marinecsi.org/news-events/ ∓

Drake N. 2013. California Shipping Lanes Moved in Attempt to Avoid Killing Whales. Wired Science [Internet]. [cited 2013 Dec 20]. Available from: http://www.wired.com/wiredscience/2013/05/whales-and-shipstrikes/ ∓

Ebert, D.A. 2003. Sharks, Rays, and Chimaeras of California. University of California Press, 284 pages. Berkeley, California.

Gubili C, Duffy CAJ, Cliff G, Wintner SP, Shivji MS, Chapman DD, Bruce BD, Martin AP, Sims DW. 2012. Application of Molecular Genetics for Conservation of the White Shark, Carcharodon carcharias, L. 1758. In: ML D, editor. Global Perspectives on the Biology and Life History of the White Shark. Boca Raton, FL: CRC Press; pp. 357–380.

Hazen EL, Jorgensen SJ, Rykaczewski RR, Bograd SJ, Foley DG, Jonsen ID, Shaffer SA, Dunne JP, Costa DP, Crowder LB, Block BA. 2012. Predicted habitat shifts of Pacific top predators in a changing climate. Nature Climate Change. 1–5.

Jorgensen SJ, Reeb CA, Chapple TK, Anderson S, Perle CR, Van Sommeran SR, Fritz-Cope C, Brown AC, Klimely AP, Block BA. 2010. Philopatry and migration of Pacific white sharks. Proceedings of The Royal Society. 277:679–688.

Kerstetter DW, Polovina JJ, Graves JE. 2004. Evidence of shark predation and scavenging on fishes equipped with pop-up satellite archival tags. Fishery Bulletin. 102(4):750–756.

Kim SL, Tinker MT, Estes JA, Koch PL. 2012. Ontogenetic and Among-Individual Variation in Foraging Strategies of Northeast pacific White Sharks Based on Stable Isotope Analysis. PLoS ONE. 7(9):1–11.

Klimley AP. 1985. The Areal Distribution and Autoecology of the White Shark, Carcharodon carcharias, off the West Coast of North America Sibley G, Seigel JA, Swift CC, editors. Biology of the White Shark, a Symposium. 9:15–40.

Lowe CG, Blasius ME, Jarvis ET, Mason TJ, Goodmanlowe GD, O'Sullivan JB. 2012. Historic Fishery Interactions with White Sharks in the Southern California Bight. In: Domeier ML, editor. Global Perspectives on the Biology and Life History of the White Shark. Boca Raton, FL: CRC Press; pp. 169–185.

Lyons K, Jarvis ET, Jorgenson SJ, Weng K, O'Sullivan J, Winkler CE, Lowe CG. 2013. The degree and result of gillnet fishery interactions with juvenile white sharks in southern California assessed by fishery-independent and -dependent methods. Fisheries Research. 147, pp. 370–380

Mull CG, Lyons K, Blasius ME, Winkler C, O'Sullivan JB. 2013. Evidence of Maternal Offloading of Organic Contaminants in White Sharks (Carcharodon carcharias). PLoS ONE 8(4):1-8.

Mull CG, Blasius ME, O'sullivan JB, Lowe CG. 2012. Heavy Metals, Trace Elements, and Organochlorine Contaminants in Muscle and Liver Tissue of Juvenile White Sharks, Carcharodon carcharias, from the Southern California Bight. In: Domeier ML, editor. Global Perspectives on the Biology and Life History of the White Shark. Boca Raton, FL: CRC Press; pp. 59–75.

Nasby-Lucas N, Domeier ML. 2012. Use of Photo Identification to Describe a White Shark Aggregation at Guadalupe Island, Mexico. In: Domeier ML, editor. Global Perspectives on the Biology and Life History of the White Shark. Boca Raton, FL: CRC Press; pp. 381–392.

Nasby-Lucas N, Dewar H, Lam CH, Goldman KJ, Domeier ML. 2009. White Shark Offshore Habitat: A Behavioral and Environmental Characterization of the Eastern Pacific Shared Offshore Foraging Area. PLoS ONE. 4(12):1–14.

NOAA, 2012. National Marine Sanctuaries Press Release. Shipping Lanes to be Adjusted to Protect Endangered Whales Along California Coast [Internet]. [cited 2013 Dec 20]; Available from: http://sanctuaries.noaa.gov/news/press/2012/pr122712.html ∓

Pondella DJ II, Allen LG. 2008. The decline and recovery of four predatory fishes from the Southern California Bight. Marine Biology. 1–7.

Pyle P, Schramm MJ, Keiper C, Anderson SD. 1999. Predation on a White Shark (Carcharodon carcharias) by a Killer Whale (Orcinus orca) and a Possible Case of Competitive Displacement. Marine Mammal Science. 15(2):568–575.

Robbins R, Bruce B, Fox A. 2013. First reports of proliferative lesions in the great white shark, Carcharodon carcharias, and bronze whaler shark, Carcharhinus brachyurus Günther. Journal of Fish Diseases. doi: 10.11.

Seibel BA. 2011. Critical oxygen levels and metabolic suppression in oceanic oxygen minimum zones. The Journal of Experimental Biology. 214:326–336.

Taylor J. 2010. The Story of Strappy. Rodney Fox Expeditions [Internet]. South Australia, Australia: Rodney Fox Expeditions. [cited 2013 Dec 30]. Available from: https://www.rodneyfox.com.au/index.php/selectedContent/624827680 ₸

Towner AV, Wcisel MA, Reisinger RR, Edwards D, Jewell OJD. 2013. Gauging the Threat: The First Population Estimate for White Sharks in South Africa Using Photo Identification and Automated Software. PLoS ONE. 8(3):e66035.

₸ Marked references have not been peer reviewed.

Personal Communications

M. Harris, California Department of Fish and Wildlife-Office of Spill Prevention and Response.